

WHAT IS CLAIMED IS:

1. A method for coupling a plurality of risers or umbilicals having lower ends fixed to an area of the sea floor to a floating vessel having a hull with a keel and moored generally above said area, the method comprising the steps of,

suspending said risers or umbilicals from an elevation above said keel, and

laterally supporting said risers at points along the perimeter of said hull.
2. The method of claim 1 wherein,

said points are disposed below the waterline.
3. The method of claim 1 wherein,

said points are disposed at an elevation generally corresponding to the elevation of said keel.
4. The method of claim 1 wherein,

said points are disposed on outboard-facing surfaces of said hull.
5. The method of claim 1 wherein,

said points are disposed on inboard-facing surfaces of said hull.
6. The method of claim 1 wherein,

said points are disposed on surfaces of a moonpool in said vessel.
7. The method of claim 1 further comprising the step of,

providing a bearing at each of said points, said bearing designed and arranged to allow axial movement of said riser relative to said vessel.
8. The method of claim 1 wherein,

said supporting is performed by a plurality of keel guides disposed at said points.
9. The method of claim 8 wherein,

at least one of said keel guides is designed and arranged to allow side entry of one of said risers.

10. The method of claim 8 wherein,
at least one of said keel guides is designed and arranged for vertical entry of one of said risers or umbilicals.

11. The method of claim 1 wherein said suspending further comprises the steps of,
tensioning said risers or umbilicals, and
allowing said risers or umbilicals to move axially with respect to said vessel.

12. The method of claim 1 further comprising the step of,
suspending said risers or umbilicals with a generally vertical orientation.

13. The method of claim 1 further comprising the step of,
suspending said risers or umbilicals from an elevation above the waterline.

14. The method of claim 1 wherein,
said suspending is performed by a spring.

15. The method of claim 1 wherein,
said suspending is performed by buoyancy of said vessel.

16. A method for coupling a plurality of risers or umbilicals having lower ends fixed to an area of the sea floor to a floating vessel having a submerged hull with a keel and moored generally above said area, the method comprising the steps of,
suspending said risers or umbilicals from an elevation above said keel, and
laterally supporting said risers or umbilicals in vertical passages formed through said hull.

17. The method of claim 16 further comprising the step of,

providing a bearing in each of said passages, said bearing designed and arranged to allow axial movement of said riser relative to said vessel.

18. The method of claim 16 wherein said suspending further comprises the steps of,
tensioning said risers or umbilicals, and
allowing said risers or umbilicals to move axially with respect to said vessel.
19. The method of claim 16 further comprising the step of,
suspending said risers or umbilicals with a generally vertical orientation.
20. The method of claim 16 further comprising the step of,
suspending said risers or umbilicals from an elevation above the waterline.
21. The method of claim 16 wherein, .
said suspending is performed by a spring.
22. The method of claim 16 wherein,
said suspending is performed by buoyancy of said vessel.
23. A floating vessel comprising,
a submerged buoyant hull having a keel,
a column having a lower end coupled to said hull, said column extending above the
waterline,
a deck coupled to an upper end of said column,
a mooring device having an upper end coupled to said hull and a lower end coupled to the
seabed,
a keel guide having a vertically oriented generally cylindrical passage therein coupled to
said hull, and

a riser or umbilical having a lower end coupled to the seabed and an upper end coupled to said vessel, said riser or umbilical passing within said passage of said keel guide.

24. The vessel of claim 23 wherein,

said mooring device is generally vertically oriented and tensioned by said buoyant hull.

25. The vessel of claim 23 wherein,

said riser or umbilical is generally vertically oriented and tensioned by said buoyant hull.

26. The vessel of claim 23 further comprising,

a keel joint disposed between said riser or umbilical and said keel guide, said keel joint designed and arranged to provide lateral support to said riser or umbilical while allowing said riser or umbilical to move in a longitudinal direction within said keel guide.

27. The vessel of claim 23 wherein,

said keel guide is disposed at an outboard-facing surface of said hull.

28. The vessel of claim 23 wherein,

said keel guide is disposed at an inboard-facing surface of said hull.

29. The vessel of claim 23 wherein,

said keel guide is disposed in a moonpool in said hull.

30. The vessel of claim 23 wherein,

said keel guide has a slot which communicates with said passage and which is designed and arranged to allow side entry of said riser or umbilical.

31. The vessel of claim 23 wherein,

said keel guide is disposed at an elevation generally corresponding to the elevation of said keel.

32. The vessel of claim 23 wherein,

said keel guide is disposed at an elevation generally corresponding to the elevation of said upper end of said mooring device.

33. The vessel of claim 23 further comprising,
a tensioner coupled to said vessel and disposed at an elevation above said keel,
said upper end of said riser or umbilical coupled to said tensioner.
34. The vessel of claim 33 wherein,
said tensioner is disposed above the waterline.
35. The vessel of claim 33 wherein,
said tensioner is disposed on said deck.
36. A floating vessel comprising,
a submerged buoyant hull having a keel,
a column having a lower end coupled to said hull, said column extending above the waterline,
a deck coupled to an upper end of said column,
a mooring device having an upper end coupled to said hull and a lower end coupled to the seabed,
an aperture vertically formed through said hull, and
a riser or umbilical having a lower end coupled to the seabed and an upper end coupled to said vessel, said riser or umbilical passing within said passage of said keel guide.
37. The vessel of claim 36 wherein,
said mooring device is generally vertically oriented and tensioned said buoyant hull.
38. The vessel of claim 36 wherein,
said riser or umbilical is generally vertically oriented and tensioned by said buoyant hull.

39. The vessel of claim 36 further comprising,
a keel joint disposed between said riser or umbilical and said aperture, said keel joint designed and arranged to provide lateral support to said riser or umbilical while allowing said riser or umbilical to move in a longitudinal direction within said aperture.
40. The vessel of claim 36 further comprising,
a tensioner coupled to said vessel and disposed at an elevation above said keel,
said upper end of said riser or umbilical coupled to said tensioner.
41. The vessel of claim 40 wherein,
said tensioner is disposed above the waterline.
42. The vessel of claim 40 wherein,
said tensioner is disposed on said deck.
43. The vessel of claim 40 wherein,
said riser or umbilical is generally vertically oriented and tensioned by said tensioner.